SOIL CONSERVATION

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VOL. I–NO. 8

MARCH · 1936

ISSUED MONTHLY BY THE SOIL CONSERVATION SERVICE, DEPARTMENT OF AGRICULTURE, WASHINGTON

SOME ABC'S OF SOIL CONSERVATION

By E. J. Utz[1]

All programs and policies in soil conservation are based on certain applicable criteria. These criteria are the result of careful study and experimentation under a great variety of conditions. The effectiveness of the resulting program depends largely on the accuracy with which these criteria have been worked out, and their proper application to the problems involved.

The principal factors to be considered in the control of soil erosion are slope, soil type, degree of erosion, and land cover. The latter two are the result of man's use or misuse of the land. The first two are not under man's control, and consequently are of basic importance in determining the land use and the erosion control practices that are to be put into effect on any given parcel of land.

Slopes Determine Erosion

Certain slopes on a given soil type are suitable for one purpose while the same slope on a different soil type cannot be used in the same way without serious losses. It was necessary, therefore, to determine what slope limits should be used for the growing of clean-tilled crops, what limits should be used only for close-growing crops, and what limits must be retired from cultivation in order to prevent serious soil and water losses, for each of the principal soil types. Thus, a knowledge of the soil type and degree of slope is of primary importance in determining the land use and the soil-conservation practices that are to be put into effect.

If soils are to be surveyed and mapped, essential information should be listed in the most usable manner, so that those carrying out the program in the field can translate it directly into land use and control methods. As a result of this viewpoint, the Soil Conservation Service set up four slope classes: A, B, C, and D. Land mapped as A slope generally requires no particular erosion-control measures other than proper rotation of crops; B slope requires particular erosion-control measures when clean-tilled crops are to be included in the rotation; C slope should be in close-growing crops, especially pasture and hay crops, and is not generally suitable for clean-tilled crops; and D slope should be retired to forest or pasture, depending on the original vegetation.

Slope Variations

Due to the variations in soil types, rainfall, climate, and other factors in the different areas, the slope limits for the different classes vary considerably. For example, in the Piedmont section of the South, the A slope varies from 0 to 2 or 3 percent, while in other sections it may run as high as 0 to 5 percent. B slopes in the Piedmont usually run 3 to 8 or 10 percent, while in other sections the upper limits may go as high as 20 or 25 percent.

[1] The author is principal soil conservationist, in charge of the Section of Erosion Control Practices.

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Much of the steep land in the United States is cultivated in regular rotation, and in many sections is devoted year after year to clean-tilled crops, until the top soil has all been washed away. The resultant deposition is now silting up streams and storage reservoirs, and adding to the flood hazards of the Nation. This damage occurs in addition to the loss resulting from the depletion of the agricultural resources of the country, and the impoverishment of the farm operators and owners.

Since slope is such an important factor in the erosibility of soils, it is given primary consideration in the determination of proper land use. On the various demonstrational areas, every effort is being made to induce farmers to retire the steeper slopes to grasses, shrubs, and trees. This type of vegetation has been found to be the most erosion resistant of the crops commonly grown.

In checking over the farm plans developed on the various project areas, and in considering the acreage of clean tilled crops that are now grown on the steeper slopes as compared with those grown on the same slopes previous to the inception of the soil-conservation program, we find conclusive evidence to demonstrate that a good land-use program has been put into effect. Table 1 shows the acreage of cotton grown on the various slopes before the soil-conservation program was initiated, and the corresponding acreage grown under the conservation plan, on 16 projects in the Cotton Belt. These projects are located in the States of Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, and Texas.

It will be noted that almost two-thirds of the reduction in acreage was made on the C and D slopes, where 12 percent of the cotton was originally grown. Less than 7 percent of the cotton on these areas is now grown on slopes steeper than those generally recommended for this crop. Individual farm conditions sometimes make it impossible to apply uniformly any rule that may be developed. Also, there are certain soil types that are less erosible than others, and allow for a deviation from the generally accepted practices.

The total reduction in cotton acreage on these 16 projects was 9.1 percent. The reduction on the A

(Continued on page 3)

TABLE 1.—*Cotton acreage estimates for 16 projects*

	A slope		B slope		C slope		D slope		Total	
	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent total reduction, all slopes
Before erosion-control program	28,144.0	16.9	118,410.0	71.1	16,037.7	9.6	3,984.8	2.4	166,576.5	.....
After erosion-control program	26,333.8	17.4	114,737.3	75.8	9,109.0	6.0	1,183.0	.8	151,383.1	.....
Reductions	1,810.2	[1] 11.9	3,672.7	[1] 24.0	6,928.7	[1] 45.6	2,801.8	[1] 18.4	15,193.4	9.1

[1] Percent total reduction.

TABLE 2.—*Corn acreage estimates for 28 projects*

	A slope		B slope		C slope		D slope		Total	
	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent total reduction, all slopes
Before erosion-control program	120,856	35.2	174,378	50.9	35,285	10.3	12,242	3.6	342,961	.....
After erosion-control program	113,233	37.7	163,017	54.3	20,286	6.8	3,782	1.2	300,318	.....
Reductions	7,623	[1] 17.8	11,561	[1] 27.1	14,999	[1] 35.1	8,460	[1] 19.8	42,643	12.4

[1] Percent total reduction.

TABLE 3.—*Wheat acreage estimates for 14 projects*

	A slope		B slope		C slope		D slope		Total	
	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent of total crop	Acres	Percent total reduction, all slopes
Before erosion-control program	19,206	24.7	41,455	53.4	15,401	19.8	1,589	2.1	77,651	.....
After erosion-control program	17,901	24.0	40,806	54.8	14,448	19.4	1,340	1.8	74,495	.....
Reductions	1,305	[1] 41.3	649	[1] 21.1	953	[1] 30.5	249	[1] 7.8	3,156	4

[1] Percent total reduction.

DAMMING LISTER PROVES USEFUL

Numbers of ingenious new mechanical devices are being developed by agricultural engineers, farmers, and others in the effort to conserve moisture and soil. One of the most interesting is that of C. T. Peacock, farmer of Lincoln County, Colo. Information concerning it comes from B. W. Allred, associate range examiner of the Soil Conservation Service, Colorado Springs.

The rainfall there averages 13 inches a year and comes usually in the form of torrential rain and hail. To catch and hold the water, Mr. Peacock worked out the machine shown in the illustration. Looking something like a beet cultivator, it has five plow points spaced at 20 inches. A few feet back of each plow point is an automatic attachment which drags along sufficient loose dirt to form a neat dam when tripped at 16-foot intervals. The machine, says Mr. Allred, goes deep enough to throw up a cloddy undersoil which is wind resistant.

During the last growing season the lister successfully held large quantities of water upon the land following large downpours and brought about production of large crop yields which otherwise would not have been possible.

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and B slopes was made incidentally to the working out of proper rotations and the use of soil-building crops which not only reduce erosion, but also increase the yields per acre.

Table 2 shows the same information for corn acreage on 28 projects in the States of Alabama, Arkansas, Florida, Georgia, Illinois, Iowa, Kansas, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Virginia, and Wisconsin. On these project areas approximately 14 percent of the corn acreage was grown on C and D slope previous to the inception of the program. This acreage has been reduced to 8 percent of the total, and corn is now grown on these slopes only where conditions are most favorable and extreme control measures are used.

Large Cut in Corn

The total reduction in acreage of corn on these 28 projects amounts to 42,643 acres, or 12.4 percent. The reduction on the A and B slopes in the case of corn is also due to the adoption of better rotations, and the increased use of soil-building crops.

Table 3 is included to show the small reduction that has been made in the acreage of wheat on the 14 projects in the States of Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, Ohio, Oklahoma, Texas, Washington, and Wisconsin. Wheat is considered as one of the less erosible or close-growing crops in the humid sections. Most of the 4-percent reduction effected on these 14 projects has been made in the dry farming sections, where summer fallow is practiced in order to store up moisture for the production of the ensuing wheat crop. In the humid sections, especially where winter wheat is grown, it makes a fairly satisfactory winter cover, and is of especial value as a nurse or companion crop for the new seeding of grasses and legumes that play such an important part in the control of erosion and the building up of the soil. The Soil Conservation program is based on correct land use, and the adoption of proper erosion-control practices.

PLANNING A CROP ROTATION IN CONNECTION WITH STRIP CROPPING

By H. L. Thomas

Strip cropping is in high favor with farmers in the Beaver Creek Valley of Minnesota. Most of them readily see the value of this method of stopping soil losses. There are some, however, who at first hesitate to undertake it because they think first, that it will not be possible to summer pasture the fields after grain is harvested; and second, that in cutting a grain strip adjacent to a cornfield, the back swath will be so long that considerable grain will be wasted. The accompanying map sets forth a farm program which avoids both of these difficulties.

The cropping plan is as follows:

Field No. / Acres	3 11.5	4 9.5	5 12.0	6 16.5	8 4.0
1936	Grain	Corn	Grain	Corn	Grain.
1937	Hay	Grain	Hay	Grain	Hay.
1938	Corn	Hay	Corn	Hay	Hay.
1939	Grain	Hay	Grain	Hay	Corn.

Field No. / Acres	9 4.5	10 16.5	11 10.5	13 9.0	15 2.0
1936	Grain	Grain	Grain	Grain	Grain.
1937	Corn	Hay	Corn	Corn	Hay.
1938	Grain	Hay	Grain	Grain	Hay.
1939	Hay	Corn	Hay	Hay	Corn.

Fields 7, 12, 14, 16, and 19, totaling 20 acres, will be seeded to alfalfa.

Areas 2 and 18 are pasture, totaling 86 acres.

Areas 1, 20, 21, and 22 are steep timber lands which are not to be grazed.

The gullied spots, G_1 to G_8, inclusive, are fenced out to protect the engineering and vegetative control measures which will be applied.

Each year there are approximately 23 acres in corn, 23 acres in grain, and 46 acres in hay, plus the 20 acres of permanent alfalfa.

Notice that a fence divides fields 3 to 6, inclusive, from fields 7 to 16, inclusive. One of these areas is always in corn and hay and the other in grain and hay. As soon as the grain is cut, one of the areas may be used for pasturing. This is of considerable importance because during August the permanent bluegrass pasture is likely to be very poor. Since the grain strips in this rotation are always bordered by hay strips, no back swaths will be necessary except along fences. The binder can be driven on the hay stubble for the first round. Thus, two of the major obstacles in the adoption of strip cropping are removed. The map brings out these points more clearly.

Large Acreage of Hay

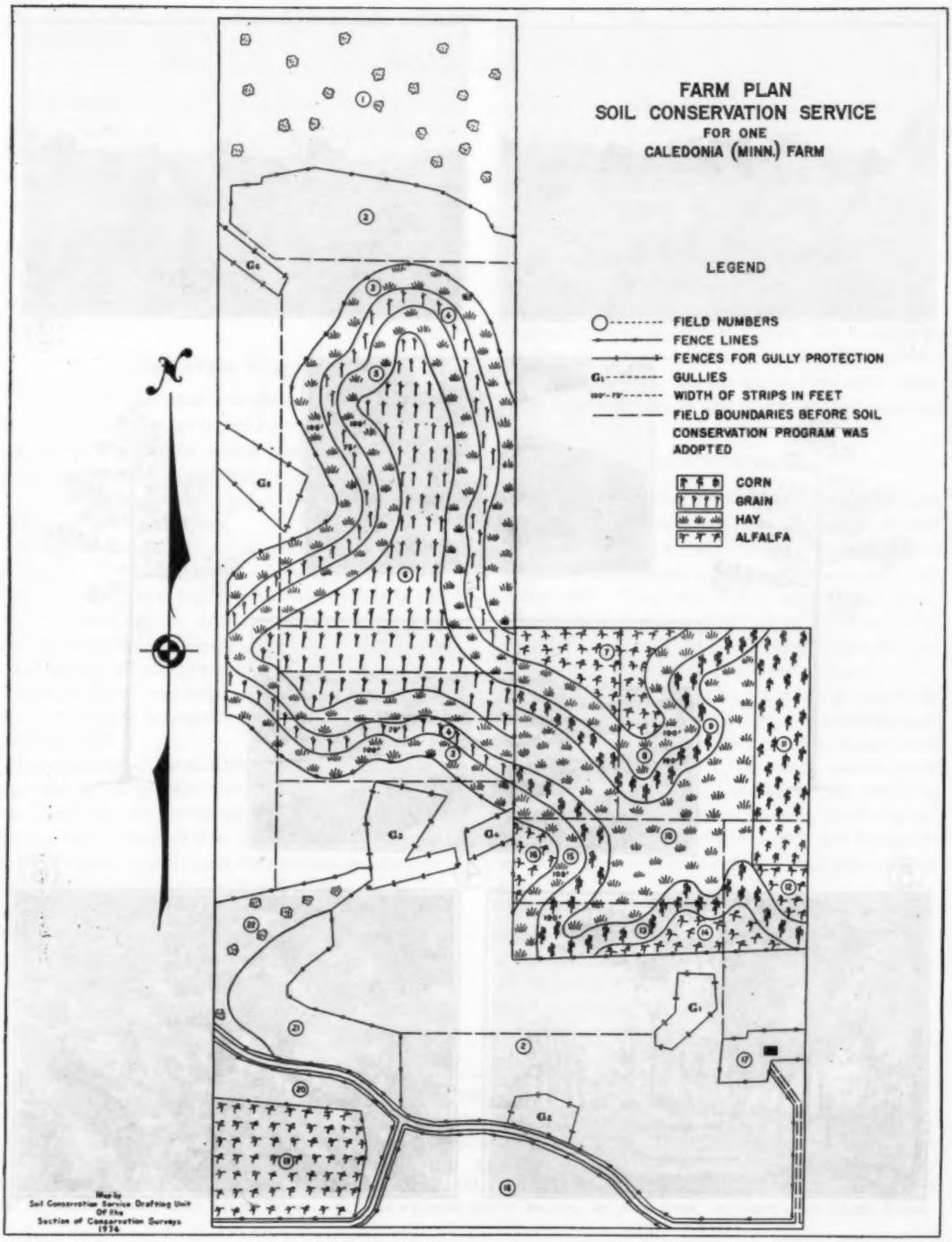
A relatively large acreage of hay and small acreage of corn is provided. This arrangement is desirable from an erosion prevention standpoint and, furthermore, it builds up soil fertility. It is particularly good farm management practice for this region if a large number of cattle are raised, as in the case of the farm in question.

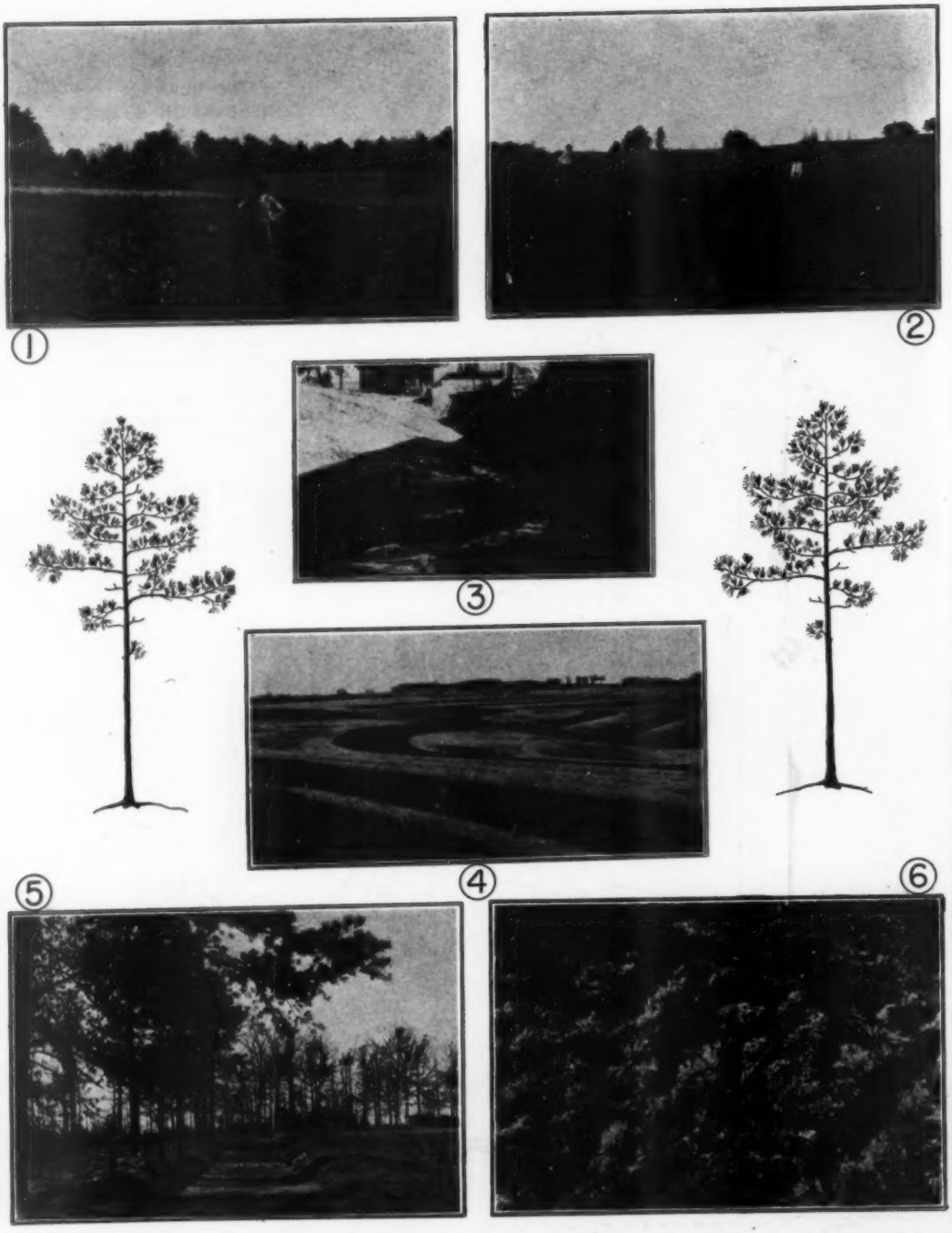
Alfalfa may be used for the hay crop in this rotation, or if the operator does not find it possible to buy the necessary lime and seed, clover and timothy may be grown. Alfalfa is much the more profitable.

An alternative rotation which could be used is as follows: Fields 3, 5, 8, 10, and 15 could be seeded to alfalfa and left in this crop as long as the stand is good, perhaps 5 to 10 years. During this time the other fields could be used for a 2-year rotation of corn and grain with sweetclover which is spring plowed for corn again. Upon plowing up the alfalfa fields, they could be used for the 2-year corn, grain, and sweetclover rotation, and fields 4, 6, 9, 11, and 13 could be put into alfalfa.

Well-Rounded Program

The map of the farm also exemplifies the complete erosion control program. The gullied areas have been isolated from grazing and will be treated with the control measures which their nature and state of development demand. Field 21 is a very steep hillside from which the trees have recently been cut, and it will be replanted to trees. The other fields protected from grazing—1, 20, and 22—are rough, steep, gullied, and timbered. They can be used most economically for the production of wood and lumber, since to give them over to pasture reduces the growth of cover to the danger point. A large part of the 86 acres of permanent pasture was formerly crop land, but most of it is rather steep for this purpose. If this pasture is not overgrazed a good sod cover will keep it from eroding.


FARM PLAN
SOIL CONSERVATION SERVICE
FOR ONE
CALEDONIA (MINN.) FARM
LEGEND
FIELD NUMBERS
FENCE LINES
FENCES FOR GULLY PROTECTION
GULLIES
WIDTH OF STRIPS IN FEET
FIELD BOUNDARIES BEFORE SOIL CONSERVATION PROGRAM WAS ADOPTED
CORN
GRAIN
HAY
ALFALFA
Map by
Soil Conservation Service Drafting Unit
Of the
Section of Conservation Surveys
1936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A NOTE ON EROSION CONTROL IN THE PIEDMONT

By Wellington Brink

The weather—not the soil—was the smoking-room topic. Streams were muddy, boiling, incorrigible. Bridges were endangered, roadbeds soggy. The train was already hours behind schedule. Human nerves were snapping. Fingers were toying with watches.

A salesman told of losing commissions. A banker fumed at missing a conference. A mill executive chafed at the cost of delay. Forward in the car people reread society pages, stock-market reports, household hints.

The Larger Tragedy

In all probability, not a single mind was occupied with the larger tragedy behind the situation: the robbery of topsoil, the silting of streams, the overflowing of bottom lands, the improvident land use which presses its problems and its burdens impartially upon city and country alike.

Here was the Dan River on one of its periodical rampages. As related in SOIL CONSERVATION in February, erosion's long fingers have been writing in red ink the journal of the stream's once amazingly prosperous watershed. Through the years they have been tallying up a depressing total of soil losses and abandoned farms, and today only the ghostly memory of a once-proud husbandry rides the field and garners the crop.

The Dan tells a familiar story—one which we see repeated on many other watersheds in Virginia and the Carolinas. Its turbulent greeting to our slow-moving train constituted an appropriate introduction to the Piedmont region with its notorious sheet washing, gullying, sedimentation, and flooding.

Here, as elsewhere, Government and farmers are today moving hopefully in research, demonstration, and improved cultural practices.

Mangum Terraces Used

At High Point, N. C. (where we stopped), it is the Deep River project. If you go to the trouble of wading ankle deep through soft red clay, you can get a good line on the effectiveness of broad-base Mangum terraces, strip cropping, and rotations. The emphasis here is decidedly on vegetative measures, although mechanical structures are given a part in the control program when their cost is justified.

Field after field is creased, wrinkled, worn. At the side of the road you note a frost action peculiar to the region; gather a handful of 2-inch crystals, each bearing at its tip a bounty of good dirt waiting for the first thaw to send it toward bottom lands, power dams, and salt seas. In this region frost must necessarily rate with wind and water in the erosional cabal.

Unruly Streams

My companion, the erosion specialist, slowed the car as we approached a stretch of road which showed the effects of the weather's recent carousal and was in need of much better grooming. Wheels sank low in the mud. There was a thin covering of debris. "That's the way our streams behave", said he. "Up one day, down the next, damaging highways and destroying farm lands as they come and go."

We stopped for a look at a tract which is part of the 24,175 acres terraced by the project. I remarked upon a small patch of corn with rows running up and down rather than on contour. "The owner insisted there was never any loss there", I was told. "But with the coming of a heavy rain we made a few rough calculations which showed half a ton of good dirt being carried down the short aisle between each two lines of stalks."

Eleven out of 13 mill ponds on Deep River have completely silted up and the whir of spindles has hushed as cotton manufacturing has sought other locations. It took but 31 years for the first dam to be made useless, 5 to 10 years more for the others to join it. Big, substantial dams of first-class masonry, representing a large investment.

PICTURES ON OPPOSITE PAGE

1. Good growth of hairy vetch on farm near Tigerville, S. C. 2. This gully was treated during summer of 1934; seeded to small grain in fall of that year; picture made Apr. 1, 1935. 3. Base of dam, Oakdale Cotton Mill, Jamestown, N. C., showing silting of mill pond. 4. Strip crop on farm near Switzer, S. C.; dark bands in oats, intervals between planted to grain; Apr. 1, 1935. 5. Broad terrace outlet ditch with rock, wire and sod spreader dams, near High Point. 6. The erosive agent known as jack frost, at work near High Point.

Stopping this waste of soils and crippling of industry is no simpler here than anywhere else. I am told that one farm in this area has 21 different soil types. Diverse soils, crops, establishments, and farming philosophies color the Piedmont and make of it a pressing challenge to soil conservationists.

Terraces straddled by strip crops; terrace outlets of rock, of tile, of wire and of sod; 2- and 3-year rotations involving corn, cotton, lespedeza, winter peas, small grains, retirement of unproductive lands: These are the shock troops of engineer, agronomist, nurseryman, forester, erosion specialist, and management expert.

They have tried many promising ideas here—lime and legumes, ingenious new machinery, plant introductions, and they've just about arrived at a simplified program of control centering on the thoroughly tested broadbase mangum terrace, strip cropping, rotation, and supplementary engineering structures, where necessary, for the control of gullies and run-off waters. They have even experimented, and with some success, with the unique waffle cultivator—first used on the erosion experiment station, Hays, Kans.—a pasture puncher which creates a 2-gallon water tank with each scoop of a shovel.

Substantial Terraces

At Spartanburg, S. C., it is the South Tyger River project. They like the Nichols terrace here—a neat, solid structure with a clearly defined water channel. It's made cooperatively, with tractor and scraper. They gouge right down into the subsoil. A year of some close-growing crop, and ordinary care, establishes the terrace as permanent, assuming that the farmer will do his part to maintain it.

They've had 2 years in which to prove the value of the Nichols terrace. And every month its strong protective arm is circling more slopes on the area. Today it is halting erosion on nearly 11,000 acres, and nearly a quarter of a million feet of terrace outlet channels are disarming the run-off waters which have such vicious tendencies in this region. It is being copied by farmers outside the project.

It's one thing to speak of 1,194,816 black locust trees having been planted in the area. It's another, to stand at the roadside and observe a dimple which was once a ditch—a growing ditch which had twice cut through the highway and was chewing again at the thoroughfare when its depredations were halted. A bulldozer sloped the banks, 400 to 500 black locust trees were planted and readily took root, the sides were banded with bermuda grass.

Yes, and there are a million and a half pines planted for purposes of anchoring soil, utilizing waste acres, creating windbreaks and game cover. There's many a good "before and after" contrast where unkempt woodlots have been accorded management for the first time—fire hazards reduced, thinning and pruning effected.

Last year they turned loose 108 pairs of quail—free to roam and multiply on the 10,000 acres signed up as State sanctuary. Wildlife conservation is a phase incidental to the complete program.

As at High Point, the principal reliance is upon vegetative measures. Noting the high frequency of corn failures, the Spartanburg staff is reducing the acreage given over to the tasseled crop and is encouraging the planting of oats. Contour farming is the rule, of course.

Experimentation

Farming is coming to be a real science down here. Take the hydraulic laboratory on Beaver Dam Creek as an example. That's where they find out exactly what happens to clay and concrete and bermuda sod when subjected to a rush of water. They've built a dam, a control flume, and waterway channels for testing the effectiveness of many types of measures and materials. They've mixed cement with native soils. They've planted and sodded and flooded. They've tried spreaders and baffles and check dams. They've subjected waterways to a wide range of volumes and velocities of flow. And already they are arriving at tentative conclusions confirming the usual adequacy of Nature's method of restraint—vegetation.

We took a look at one of the C. C. C. camps assigned to soil-conservation work. It's the one near Switzer, 12 miles out of Spartanburg. Two hundred and

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PICTURES ON OPPOSITE PAGE

1 and 2. Before and after views of a woodlot demonstration near Spartanburg. 3. Water flowing over rock masonry baffles at hydraulic laboratory; discharge approximately 13 cubic feet per second; depth of flow at baffle about 8 feet. 4. General view of dam and control flume at hydraulic laboratory; flood gate regulates amount of water entering flume. 5. Pasture on dairy farm near High Point cultivated with waffle cultivator. 6. Abandoned roadway treated for waterway; baffle boards and bands of bermuda grass used; bands 18 inches wide and 10 feet apart.

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MEADOW STRIPS IN EROSION CONTROL

By H. L. Dunton [1]

Meadow strip after seeding and liming, Aug. 16, 1935.

Keen interest attended the preparation of the first meadow strip in the Chatham, Va., project in July 1935—the first of 25 such strips to be laid out and seeded in the Banister River area.

As used here, a meadow strip serves as an outlet for terraces draining into it from bordering fields. It is located in a swale or depression which serves as a natural drain. The width of the strip varies according to the natural width of the depression, some of those already constructed being 100 feet wide. The width must be sufficient for the edges of the strip to be 1 or 2 feet higher than the center, thus eliminating the danger of cutting and gullying at either side. The wider the strip, the greater the spread of water and the less likelihood of cutting.

The length of the strip is also of high importance, as the water must be conducted slowly from the field to a point where other methods of control can be brought into play. The area of the strips so far constructed varies from an eighth of an acre to nearly 5 acres.

Many factors govern the location of a meadow strip, among them slope, drainage area, the presence of deep gullies, the existence of sufficient topsoil for a good sod, the natural width and length of the depression.

Generally speaking, meadow strips for handling the run-off waters from 15 to 30 acres should not be constructed on slopes over 6 percent. The optimum slope is about 4 percent. The presence of deep gullies usually precludes the construction of a meadow strip. A narrow depression of from 10 to 15 feet in width that cannot be widened is not usually suitable. Factors determining the location of a meadow strip are interdependent and no arbitrary rules are possible.

Nearly always a certain amount of machine grading is necessary. Grading provides a slight slope toward

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[1] The author is now extension agronomist with the Virginia Polytechnic Institute. He was formerly with the Soil Conservation Service at Chatham, Va.

Same meadow strip, Sept. 24, 1935.

EROSION CONTROL IN PIEDMONT

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twenty young chaps there—happy, jolly, husky from their outdoor life, interested in their work. I lifted the hood of a big truck, found the engine clean as a new whistle. There's a reverence for tools, equipment, trees, soil. Many of these enrollees come from farms, and they will take back home their acquired knowledge of gully-checking and erosion control.

Piedmont farmers are applying the lessons of the project demonstrations. Farm after farm outside the areas are putting up defenses—mechanical and cultural—against the assault of the elements.

Will all this have any appreciable effect or will the Dan and the Deep and the South Tyger and their companions continue indefinitely to carry away the basic wealth of the watersheds? Soil conservationists think not. They believe that the hydrologic stations set up at strategic points along streams will in time record material improvement—that their data will prove that a positive check has been put upon erosion in the treated areas, and point to a gradual reversal of the trend in land use.

MEADOW STRIPS

(Continued from page 10)

the center, draws the water from each terrace, causes a spreading rather than a concentration of water at each terrace end.

Temporary Ditches Cut

After grading and seeding, temporary ditches are cut around the strip to keep excess run-off water from injuring the new seeding. With the establishment of a good sod, these temporary ditches are filled and the water from the terraces allowed to empty onto the strips.

Every effort is made to obtain and to maintain a good substantial sod, by the use of lime, fertilizer, and a mixture of grasses, clover, and lespedeza. Spots of low fertility are usually mulched to assist in sod establishment. Hard rains shortly after seeding often cause small washes which should be immediately mended by using good soil and reseeding. A complete sod is essential. To insure permanency the farmer should fertilize and lime the strip in the future. It is also important to clip the grass on the strip, thus affording a goodly amount of quality hay. A meadow strip properly cared for will prove to be very profitable in many ways.

The principles involved in the construction of meadow strips, as described above, can be used on many farms. Small drainage ways or gullies in a field may be prepared for seeding, limed and fertilized, mulched, and allowed to remain in grass.

REGIONAL AGRONOMIC CONFERENCES

Regional conferences of project managers, agronomists, nurserymen, and other Soil Conservation Service workers were held at Albuquerque, N. Mex., January 20–24; Amarillo, Tex., January 27–28; Stillwater, Okla., January 30–31; and Huron, S. Dak., February 3–4. Several State agricultural experiment station, extension, and Forest Service men also took part in the conferences. At each meeting committees recommended policies and procedures to guide those doing agronomic, pasture, and range-management work.

Handbook Contemplated

In region 8, the Southwest, the program was directed toward the development of a handbook covering soil-conserving plants, agronomic and range-management practices, and their use in our work.

In the Southern Great Plains wind erosion region, no. 6, reports covering the principal features of the work of each project were followed by the discussion, amendment and adoption of committee reports concerning land management on the major soil types, cultural practices for the principal crops, the revegetation of land to be retired from cultivation, and the restoration of the range.

Rotations Discussed

In region 7, the Central Great Plains, the program included reports and discussions of representative projects for each district of the region, and the reports of committees concerning crop rotations and cultural practices for the several areas where cotton, wheat, and corn production and mixed farming predominate. Recommended methods of revegetating abandoned land and desirable pasture and range-management practices were also discussed and made a part of the regional policy in soil conservation.

Wind Erosion

In region 9, the Northwest, the program consisted of a presentation of the principal methods of controlling wind erosion, such as crop selection and rotation, seeding and tillage methods, and strip cropping; project reports and committee reports which were adopted to serve as the basis for the agronomic and range management policies of the region.

In each of the regional conferences, the work of the nurseries was discussed and plans were developed for apportioning and distributing the seeds collected during 1935, and the plants available in the nurseries, as well as for future plantings and collections. The most urgent problems requiring research were also discussed and recommended to the research staffs.

Plans are being made to hold similar conferences in the other regions of the Soil Conservation Service, beginning the second week in March.

KUDZU IS THIS FARMER'S FRIEND

By E. M. Rowalt

Kudzu came out of Japan and somehow got onto porches in Alabama. Porch vine, they call this legume down there. Now the S. C. S. boys are using it, by the acre. They're retiring 3 percent of the land to it, I was told by R. Y. Bailey. And some of the natives are shaking their heads. "What are we to do with all this porch vine?" they ask. "Feed it, graze it, cut it for hay", Bailey answers, and dropping into the vernacular of the agronomist, he adds, "It compares favorably with alfalfa." But the kudzu story is not merely "feed values", it's "soil binding." It literally ropes land down. Everybody in Alabama knows this, and that is why some are afraid of it. "It might take our fields." This prejudice is gradually being overcome, but many are still skeptical about its feed value. They can't believe porch vine will make good feed. And so, when R. Y. Bailey finds testimony of kudzu feeding worth outside experiment station reports, he takes it down. There follows the report of John Wooddy, Camp Hill, colored farmer, as told to a stenographer.

I never had no mule when I fust moved here. I got the mule a few days after I moved, along the last of March. The mule was dead po'. I met Mr. Judge Johnson in front of his house when I was going on to town to have her shod and he said, "What I had?" I said, "A mule", and he just laughed. When I passed on by his store he told me to come by a minute and I went on in the store and he told me to be particular and I asked, "What?" He said, "They are right in behin' you and if you don't mind they are going to catch you", and I sed, "I ain't done nothing to catch me for", and I sed, "Who, Mr. Johnson?" and he sed, "A crowd of buzzards."

Skeptical as to Mule

I come on down the road to Mr. Earnest Mooney's and him and his wife and his chillun, they all come out to the road looking at the mule. Mrs. Mooney, she sed I mought git home with her but told me I had better be particlar crossing the bridge down there as

the buzzards mought catch me as they roosted down the creek.

My brother-in-law asked me if that was what I was going to farm with and I told him, "Yer." He sed I had better just as well go somewhere and try to git a job cause that mule will be dead 'fore Satday night.

No Better Off

I come on home and my wife, she sed, "You ain't no better off, you had a steer last year and nothing to eat and this year, you have something to eat and nothing to plow."

When I fust got the mule she got down and we would have to help her up. When I was feeding her, some would say not to feed her too much it mought kill her. I didn't see her git no better 'till I fust started to cutting kudzu and feeding it to the cow. On the 15th day of April was the fust day I started to feeding the mule on kudzu. It was not over 4 or 5 days after that before she got where she could git up and down by herself and has been picking up ever smce. If you feed her sweet feed and kudzu, she will eat the kudzu 'fore she will the sweet feed. They say she has picked

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EVEN POOR COVER IS BETTER THAN NONE

By M. E. Musgrave [1]

Be it ever so humble, there is nothing like cover. In the Navajo country no bit of growing vegetation is looked upon with scorn.

When the Nakai Bito Experiment Station was fenced in the late fall of 1933, there was no difference in appearance between the range inclosed and that without. In the bottom of the washes, on their deltas, on the farm lands and on the low hills was an abundance of sand which the prevailing winds, from the southwest, kept constantly on the move. Soon our east-and-west fences were piled high with sand and brush. Russian thistle, or tumble weed, formed the greater part of this deposit, although in some places sand alone would lodge against a mesh wire or even a five-strand barbed wire fence.

Two Areas Watched

Two areas which were nearly identical at the beginning of the windy season of 1933 provided us with an interesting study. Both plots lay alongside a fence, but to the south of one we had no control over livestock, while the land south of the other area, although outside the fence, was under our direction. Here we permitted no livestock within 2 miles of the fence. In a short time there was a very marked difference. The land below the first area, constantly trampled and loosened by the feet of stock, was soon in the air. Thousands of tons of good top soil were blown away. Some lodged against our fence. Much of it drifted through, covering the vegetation to a depth of from 18 to 36 inches. Farther from the fence line, the effect was not so detrimental. The grass caught a certain amount of the blowing sand, depositing it around the plants and thus creating a mulch which conserved moisture and helped to preserve plant life.

Thistle Takes Hold

On the other area, there was at first a sand deposit along a north fence. But, under protection, Russian thistle and such native grasses as alkali sacaton, Hilaria, foxtail and grama soon grew up. The thistle remained on the ground throughout the winter, with the exception of a few small clumps exposed to the wind. As a consequence of this ground cover, sand blowing was almost completely stopped. The windrow of sand formed along the fence within a few months became covered with a dense stand of seedling Russian thistles.

I have often heard the charge made that Russian thistles are taking the country. And, yet, in some places the Russian thistle has proved to be nature's last dependence. If it had not been for the Russian thistle on a large part of the Navajo country, there would probably have been little land left, since in many places the soil is very shallow. While it isn't the best of forage, the Navajos have been able to lamb their sheep on these weeds.

Any cover at all is better than none, and where the poorest can hold on for a time, it may prepare the way for a better type later.

[1] The author is senior soil conservationist, Soil Conservation Service, Albuquerque, N. Mex.

KUDZU, FARMER'S FRIEND

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up 200 pounds, so they tell me, I don't know. Mr. Judge Johnson sed for me to bring her to town he wanted to weigh her. Sed he didn't believe she was alive. He don't believe I made my crop with the mule but I did not have no help 'cept with her.

Surprising Crop

Mr. Frank Wrenn told my dad-in-law that he ought to see my crop. He sed he never seen nobody or no horse doctor take care of a mule and brought the mule out any better than I did. Sed he ought to come and see my crop and the mule.

It has been 3 weeks ago I passed Mrs. Mooney's agin and she was a-coming from the cowpen and she stopped me and looked at the mule and sed, "Don't you tell me that that is the hide and cocklebur that you carried on by here about 2 or 3 months ago." I told her, yesmam that she was.

Milk Increased

I had a milk cow when I come over here. The calf was 'bout 8 months old. She was dry, only give about 1 pint of milk a day. I told my wife I believed the cow would come back to her milk if she had something to eat. She sed, "No, she never would come back to her milk until she found another calf." After we went to

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STUDY SHOWS HIGH COST OF EROSION TO HIGHWAYS

Erosion caused more than one-third of all damage to 194.3 miles of highway on which records were kept for 16 weeks.

This conclusion is drawn from preliminary figures of a 12-month study being conducted cooperatively by the Soil Conservation Service and the highway commission of Vernon County, Wis. The study hinges upon weekly reports of 25 road patrolmen of the county, which is typical of the naturally rough topography of the so-called "driftless area" of southwestern Wisconsin, southeastern Minnesota and parts of Iowa and Illinois. In this area the S. C. S. is demonstrating erosion-control methods on seven different watersheds.

Highway patrolmen in this county are engaged in (1) routine work such as smoothing the road surface, drainage, cutting brush and weeds along roadsides, constructing guard rails on culverts and bridges, resurfacing old and new sections worn by traffic, repairing shoulders, filling joints on concrete highways, patching traffic-worn spots on concrete or tarvia surfaces, and (2) work done as a result of erosion, such as clearing away stones and other debris, repairing culverts and bridges after floods, filling in or resurfacing washed spots, clearing ditches, and repairing dams built in road ditches to care for flood waters.

Patrolmen were furnished with a mimeographed form providing spaces for the foregoing divisions of work, and instructions for reporting upon them. Fifteen of the patrolmen have kept records sufficiently accurate for use in the summaries which follow.

Patrolman's file number	Miles of road patrolled	Number of weeks [1] covered by reports	Hours, erosion work	Total hours, all work	Percentage of work necessitated by erosion
1	10.8	16	512	892	57.40
2	14.0	12	273	686	39.80
3	13.0	12	190	700	27.14
4	14.5	16	197	954	20.65
5	5.5	16	122	958	12.73
6	14.5	13	331	946	34.98
7	13.0	14	159	777	20.46
8	16.5	14	383	840	45.59
9	7.0	11	383	648	59.10
10	14.0	16	243	909	26.73
11	16.0	16	290	960	30.20
12	11.5	16	219	936	23.40
13	20.0	14	248	672	36.90
14	13.0	15	397	794	50.00
15	11.0	16	294	924	31.82
Total	194.3	219	4,241	12,596	[2] 33.67

[1] Reports cover a maximum of 16 weeks starting May 19 and ending Sept. 7, 1935.
[2] Average.

The proportion of time spent on road work to offset damages from erosion and floods, as shown by the above data, is enough to cause great concern over the damage from these sources. As a matter of fact, extra crews were used on some parts of the 194 miles of highway after heavy floods and severe damage from erosion had occurred, and their time was not recorded in the summary.

It is safe to assume that those roads, passing through areas where all adjoining farms are now operated according to erosion-control plans, will be less subject to serious damage from erosion and floods in the future. It probably will be impractical, because of wide variation in weather conditions, to estimate the value of controlling erosion on adjoining lands, in terms of the reduction of erosion and flood damage to highways. It does, however, seem very logical that reforestation of steep woodland areas, construction of gully-control structures, terracing of the more level ridge lands, contour tillage, and strip cropping, along with better pasture management, will aid importantly in reducing the damage caused by excessive run-off water.

Arrangements have been made to continue this study until May 19, 1936.

KUDZU, FARMER'S FRIEND

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feeding her on the kudzu, in about 2 weeks she picked up somewhere along about 1 gallon of milk a day and my wife sed she believed she would come back to her milk if we just increased the kudzu with her and we did and it come on up to 2 gallons a day.

When you come in from the pasture with the cow and have a pile of kudzu and she gits a sight of it, she kicks up her heels and runs to it. I feed her on kudzu twice a day. She is in the lot now and if you will carry her some kudzu, she will come and meet you.

I have a sow that brought pigs 'bout first of May. She ain't had a mouthful of nothing to eat 'cept kudzu vines and the slop from the kitchen. The pigs they be 7 weeks old today. I have been feeding the sow on kudzu ever since before the pigs was born and have been feeding her on it ever since. The pigs are pretty. Course the sow is sorta off but I have seed sows that was fed that was in worser shape than she is.

SOIL CONSERVATION AND THE NORTH AMERICAN WILDLIFE CONFERENCE

By William R. Van Dersal [1]

Upon invitation of the President of the United States there met in Washington, D. C., February 3 to 7, 2,500 persons interested in the conservation of natural resources, particularly wildlife. The conference met to attempt to organize into a unified, coherent group the individuals and organizations most concerned in the restoration and conservation of wildlife. It was recognized clearly that differences in outlook among certain factions have led to a notable waste of energy in the past, while our wildlife resource has continued to dwindle. Protectionists and sportsmen appeared at the meetings, determined to find a common ground in order that concerted action might be taken to restore and perpetuate for posterity the wildlife resources of the continent.

Common Ground Found

Essentially, that common ground was found. With the formation of the General Wildlife Federation, for the first time the possibility looms that "adequate public recognition of the needs and value of wildlife" may be attained. With Jay N. Darling, as president, the federation has dedicated itself to accomplishing the objectives of a national and continental plan for the organized development of the wildlife resource.

The conference included meetings of a general nature wherein were discussed the wildlife crisis of the continent, the resources of the Nation, the organization of all wildlife interests into a federation, and the possible solutions to the problems of wildlife conservation. In groups, meeting concurrently, were considered basic problems of wildlife management and game breeding, farmer-sportsmen cooperatives, fur resources, pollution, stream and lake improvement, wildlife diseases, and forests and forest wildlife. Exhibits set up by various Government agencies and other organizations demonstrated visually the part played in national economy by wildlife conservation.

Revegetation Favored

The relation between proper land use and wildlife conservation was clearly seen and pointed out by many speakers. The control of erosion through revegetation as practiced by the Soil Conservation Service was shown to bear definitely and fundamentally on the restoration of wildlife habitats, and the improvement of conditions for birds, fish, and mammals.

Said Ernest G. Holt, head of the section of wildlife management, "There can be no real wildlife conservation" in the absence of soil conservation. This is basic, fundamental. . . ." The ruined acres destroyed by erosion cannot support the necessary food and cover plants essential to wildlife existence, he continued and the "reckless abandon with which we have ripped off . . . protective covering of vegetation" has been a "real factor in the disappearance of our farm game. . . . With revegetation the keynote of the soil conservation program, wildlife management in the Service largely resolves itself into proper coordination of erosion control operations so as to obtain the desired environmental controls."

Acknowledging the tremendous task before the newly created federation, Mr. Holt pointed out that, "If the salvation of our wildlife is a job too big for any one agency, how patent it is that the salvation of our soil, on which all life depends, is a task that demands the concerted and determined action of the whole Nation!"

The organization of this group of people for the avowed purpose of conserving a national resource is one of the signs of the times. As a Nation we are beginning to awaken to the necessity of using wisely that we may not lose entirely the remainder of the once-bountiful heritage of our land. It is to be hoped that the new General Wildlife Federation may work with us as we work with them, in assuring to posterity a properly conserved, valuable resource of wildlife.

FUTURE MEETINGS OF INTEREST TO S. C. S. WORKERS

American Society of Mechanical Engineers. Week of June 15th, 1936. Dallas, Texas.

International Conference on Soil Mechanics and Foundation Engineering. June 22–26. Harvard University.

World Power Conference, Congress of International Commissions on Large Dams. September 7–12, 1936. Washington, D. C.

[1] The author is biologist with the Soil Conservation Service.

BOOK REVIEWS AND ABSTRACTS

By Phoebe O'Neall Faris

A contribution from the Soil Conservation Service Library

POSSIBILITIES OF SHELTERBELT PLANTING IN THE PLAINS REGION.

Prepared under the direction of the Lake States Forest Experiment Station, United States Forest Service. 1935.

This is a report of the shelterbelt forestation program involving approximately 114,700 square miles of land within a 100-mile-wide zone extending through the prairie-plains region from the Canadian border southward into the Texas Panhandle. Climatically this region is a transition zone between the humid region to the east and the semiarid region to the west, embracing all gradations between the two. It is characterized by low annual precipitation occurring mostly during the summer, frequent droughts, great range in temperature extremes, low humidities, and almost constant winds of comparatively high velocities. The land surface varies from level to rolling. The typical soils are the Chernozem and chestnut-colored soils, with considerable areas of dune sand. Hot desiccating winds are of frequent occurrence in summer. In winter, cold winds and blizzards are common, while in spring the region is often visited by devastating dust storms.

As time passes, agriculture in the Great Plains region becomes more and more hazardous. Frequent long drought periods and consequent dust storms have resulted in increasing economic losses and human and wildlife suffering. The drought of the last few years clearly brought into focus the urgent need for coordinated and planned use of the plains and prairies for the prevention of desert formation.

This report, the work of 14 authorities in forestry, deals with the results of investigations preliminary to the launching of the plains shelterbelt project, and the first season's procedure during the latter half of 1935, in the planting of 6,800 acres of young trees.

Much space is given the subject of soil and forest relationships of the shelterbelt zone. The results of many years of work by the Bureau of Chemistry and Soils and the agencies of the several States are available, and these are fortunately supplemented by the soil erosion reconnaissance survey made in 1934 by the Soil Conservation Service. Consequently, a main task of the Forest Service and cooperating agencies, in compiling shelterbelt data, was to make a canvass of the territory, carefully correlating soil-type classifications, observing kinds and conditions of tree growth, and referring each group of trees to its place on the soil map.

A large section of the report is devoted to a general description and grouping of the soils of the shelterbelt zone, with classification of trees with regard to rooting depth and habit of growth. None of the factors contributing toward soil development is uniform throughout the proposed shelterbelt area. The semiarid climate and especially the grass vegetation have, however, given the soils of the region as a whole two outstanding features, namely, dark topsoils containing a greater or lesser proportion of black decomposed organic material, and a zone of calcification or lime enrichment at a shallow depth in their subsoils, marking in a general way the lower limit of water percolation from the surface. These features are present in varying degrees in the soils of 85 percent or more of the area.

The root systems of 125 trees and shrubs occurring in the shelterbelt zone, 84 on fine-textured and 42 on sandy soils, were examined during the process of survey, the point of chief interest being the depth of root penetration in the different soils. It was found that rooting is invariably deeper in sandy than fine-textured soils in all localities where the water table is beyond reach of tree roots. Among the fine-textured upland soils, however, rooting is deeper in those developed from loess than in those from other geologic formations, that is, in the loess-derived soils of Nebraska and northwestern Kansas. Rooting is shallowest in the fine-textured drift-derived soils of the Dakotas. The roots of most trees are most numerous above the zone of lime enrichment, within the upper 2 or 3 feet of the soil profile where such factors as moisture, nutrients, aeration, temperature, and soil organisms are most favorable for growth.

A chart is included in the report representing graphically the occurrence and the ecological value of species of native trees and shrubs in the shelterbelt zone. Of the 73 trees and shrubs considered of ecological importance within the zone and included in the chart, 40 are found in the North Dakota section, 43 in South Dakota, 49 in Nebraska, 41 in Kansas, and 50 in Oklahoma and Texas. The trees and shrubs native to the areas are more drought-resistant than representatives of the same species growing under more favorable moisture conditions.

The amount of ground water within the shelterbelt zone, not including the soil and subsoil moisture, is far greater than that of the surface water and considerably greater than the volume of annual rainfall. It supplies wells, subirrigation, and springs. A knowledge of the location of areas in which the water table lies at depths of 5 to 20 feet is invaluable, because such localities offer the best possibilities in the shelterbelt zone for tree planting, from the point of view of growth and longevity. The distribution of the water-bearing formations of the zone is shown by accompanying areal geologic maps and cross sections.

In its origin the Plains Shelterbelt Project received public support largely as a measure for immediate relief of drought-stricken farmers. It should be pointed out that the immense program will require a large amount of local labor and provide considerable cash income to farm families for many years to come. Likewise, thousands of instances have been reported in which crops have been benefited by plantations of trees. Shelterbelts prove particularly advantageous in the protection of orchards and gardens, farmstead buildings, and livestock; and there remains no doubt whatever as to the adequacy of any type of windbreak or shelterbelt in the prevention of soil blowing and gullying.

LITTLE WATERS. By H. S. Person, With the Cooperation of E. Johnston Coil and Robert T. Beall. November 1935.

This is a compilation of scientific data from various Federal, State, and private agencies, with findings and recommendations for utilization and control of small streams. Contains a brief, comprehensive outline of the essential aspects of the hydrologic cycle, with an analysis of absorption and infiltration variations in connection with damage to ground-water supplies by improper drainage and the removal of forest and sod cover. There are constructive suggestions for contour plowing, terracing, and strip-planting in headwater areas, as well as check-dam construction in gullies and streams.

Accompanying charts illustrating soil and water losses through cultivation in little water areas. Forty-five fine photographs showing little-water gullying in varying stages, check dams and grass and forest cover as erosion-retarding agents, contour plowing and terracing, strip-cropping, reservoirs.